

REMARKS

The Final Office Action dated July 22, 2010 and the Advisory Action dated November 15, 2010, have been received and carefully noted. Furthermore, the Applicants respectfully thank the Examiner for the courtesies shown to the Applicants' representative during the Examiner Interview of November 8, 2010. The above amendments and the following remarks are being submitted as a full and complete response thereto. Claims 1, 4-6, 15 and 16 are pending. By this Amendment, Claim 1 is amended to include the conventional feature of a retaining ring for axially securing the hub relative to the shaft. Support for the amendments to Claim 1 can be found on at least page 12, line 25, to page 13, line 4, of the application as originally filed. Applicants respectfully submit that no new matter is presented herein.

Objection to the Drawings

The drawings are objected to under 37 CFR 1.83(a) for not showing every feature of the invention specified in the claims. The Applicants respectfully submit that Figure 1 was amended in the Response filed on October 22, 2010, to show the conventional feature of the hub being axially secured to the shaft, the amendment being accepted by way of the Advisory Action dated November 15, 2010. The Applicants respectfully submit that it is common knowledge in the art of automotive engineering that the hub and shaft must be axially secured with respect to one another in a constant velocity joint. For example, U.S. Patent No. 6,142,033 to Beigang discloses using a retaining ring 3 situated in annular grooves 6 and 8 and U.S. Patent No. 5,779,551 to Stall et al. discloses using a securing ring 12 to secure the hub 3 from axial movement with respect to the shaft 1. Moreover, the Applicants respectfully submit that the

Specification as originally filed clearly indicates to persons skilled in the art that the Applicants were in possession of the conventional feature as claimed (see, e.g., page 12, line 25, to page 13, line 4). Thus, the Applicants respectfully submit that the detailed illustration of the conventional feature of axially securing the hub with respect to the shaft with a retaining ring is not essential for a proper understanding of the invention and may be illustrated as shown in Figure 1, i.e., with a labeled representation. See 37 C.F.R. §1.83(a). As discussed during the Examiner Interview, an innovative aspect of the present invention is the predetermined nature of the axial offsets, as recited in Claim 1 and detailed throughout the written description. The Applicants respectfully submit that any structural detail that is of sufficient importance to the innovative aspects of the invention are described and shown in the drawings (see *Ex Parte Good*, 1911 C.D. 43, 164 O.G. 739 (Comm'r Pat. 1911)).

Applicants respectfully request withdrawal of the objection.

Objection to the Specification

The Specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. In particular, the Office Action asserts that every element recited in the claims must be described in the written description with reference characters regarding the drawings; or those features must be deleted from the claims. The Applicants respectfully submit that Figure 1 has been amended in the Response filed on October 22, 2010, to illustrate the conventional feature of the hub being axially secured to the shaft. Furthermore, the Specification has been amended in the Response filed on October 22, 2010, as discussed above to reference the conventional

feature illustrated in Figure 1. Please note that the Advisory Action dated November 15, 2010, indicates that the amendment was accepted.

Accordingly, the Applicants respectfully request withdrawal of the objection.

Claim Rejection – 35 U.S.C. § 112

Claims 1, 4-6, 15 and 16 is rejected under 35 U.S.C. § 112, first and second paragraphs, as failing to comply with the enablement requirement and for being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Office Action asserts that the feature of the hub being axially secured to the shaft is not described in the Specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention without undue experimentation. The Applicants respectfully disagree.

Since the combination between the hub and the shaft is a feature for transmitting torque to members mounted on each of the hub and the shaft, the hub and the shaft have to be supported (secured) on these members in any way. For instance, the present invention has the hub and the shaft serving as part of a constant velocity joint. The shaft comprises a power transmitting shaft, and the hub functions as an inner ring which has guide grooves receiving therein balls. See, e.g., page 12, lines 5-12, of the application as originally filed. As is well known to one of ordinary skill in the art, the hub must be axially secured to the shaft to prevent displacement of the hub in an axial direction from the shaft. For example, as discussed above, Beigang discloses using a retaining ring 3 situated in annular grooves 6 and 8 and Stall discloses using a securing ring 12 to secure the hub 3 from axial movement with respect to the shaft 1.

The Applicants respectfully note that it would not take undue experimentation on the part of one of ordinary skill in the art to axially secure the hub relative to the shaft with a retaining ring, as recited in Claim 1. As noted above, the claimed feature is a conventional feature in the art. Moreover, as discussed during the Examiner Interview on November 8, 2010, the gist of the present invention is to prevent stresses from concentrating on certain regions when transmitting a torque by engaging the shaft tooth section and the hub tooth section. Thus, the most important features of the shaft tooth section and the hub tooth section, as recited in the claims, are described in detail. In contrast, the feature in which the movement of the hub in an axial direction relative to the shaft being is restricted by a retaining ring is a feature so well known in the art that significant detail in the written description is unnecessary for one of ordinary skill in the art to practice the invention, as claimed, without undue experimentation.

Applicants respectfully request withdrawal of the rejection.

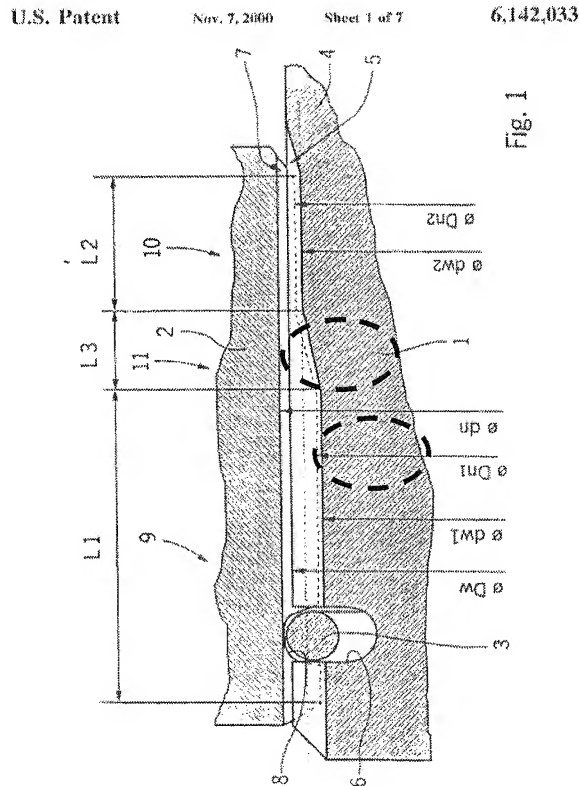
Claim Rejection -- 35 U.S.C. 103

Claims 1, 4-6, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,142,033 to Beigang in view of FR Patent No. 2,562,969 to Jacques. Applicants respectfully traverse the rejection.

Claim 1 recites a mechanism for transmitting torque between a shaft and a hub that includes, among other features, a hub axially secured relative to a shaft by a retaining ring in a position disposed around the shaft, a shaft tooth section having shaft teeth formed on the shaft and a hub tooth section having hub teeth formed on the hub, wherein a first starting point of a first step region and a second starting point of a second step region are offset from each other in the axial direction of the shaft by a

predetermined distance, and wherein the end of the second portion and the end of the second peak portion are offset from each other in the axial direction of the shaft by a predetermined distance.

Beigang discloses a shaft/hub unit having a shaft 1 with shaft tothing 5 and a hub 2 with hub tothing 7, both sets of tothing engage one another. The tooth profile in Fig. 1 clearly illustrates that Beigang does not teach or suggest that the predetermined axial offsets between the first starting point of the first step region and the second starting point of the second step region and between the end of the second portion and the end of the second peak portion, as recited by Claim 1.



As highlighted above in Fig. 1 of Beigang, the first starting point of the first step

region of the shaft tooth section and the second starting point of the second step region of the hub tooth section are aligned along the axial direction of the shaft 1, as are the end of the second portion and the end of the second peak portion. Beigang does not disclose, teach or suggest the predetermined axial offset features of the hub and shaft tooth sections recited in Claim 1. When the starting points of the step regions (slopes), for example, are aligned with each other as disclosed in Beigang, a stress concentrates in the shaft. In contrast, in the present invention, the starting points are offset and the stresses are distributed for increased static mechanical strength and fatigue strength. See the comparison data presented in Fig. 9 and the associated discussion describing the effects found on page 21, line 13, to page 22, line 6, of the Substitute Specification.

The Office Action dated December 28, 2009, on page 4, admits that Beigang fails to disclose “the first starting point of the first step region and the second starting point of the second step region being offset from each other in the axial direction of the shaft by a predetermined distance.” However, as noted in the Interview Summary and the Advisory Action of November, 15, 2010, the Examiner indicates that a directional component of axially securing the hub to the shaft (i.e., in an installation direction) must be disclosed and claimed. The Applicants respectfully disagree. As discussed above, the gist of the present invention is to prevent stresses from concentrating on certain regions when transmitting a torque by engaging the shaft tooth section and the hub tooth section. The offset features, as recited clearly and distinctly in Claim 1, prevent the stresses from concentrating. Furthermore, the plain meaning of the terms in Claim 1 indicate that the predetermined distances of the offsets occur at a position when the hub is axially secured relative to the shaft and not at some arbitrary position during

assembly or disassembly. The Applicants respectfully submit that the feature of axially securing the hub relative to the shaft with a retaining ring is such a well known feature in the art that further description and/or illustration in the present invention is unnecessary.

Beigang explicitly teaches away from the predetermined offsets when the hub and the shaft are disposed in a position with the hub being axially secured relative to the shaft by a retaining ring. As shown in Figure 1, the shaft/hub unit of Beigang teaches three portions, a first portion 9, a second portion 10, and a portion of transition 11. In the first portion 9, the shaft toothing 5 has a base diameter $dw1$ and the hub toothing 7 has a major diameter $Dn1$. In the second portion 10, the shaft toothing 5 has a base diameter $dw2$ and the hub toothing 7 has a major diameter $Dn1$. Beigang teaches that the portions 9 and 10 have a specific longitudinal length $L1$ and $L2$, respectively, and that "[b]etween such portions 9, 10, there is positioned the portion of transition 11 having the length $L3$, in which portion 11 the base diameter of the shaft toothing 5 and the major diameter of the hub toothing 7, in the longitudinal direction, increase constantly from the first portion 9 to the second portion 10, with the base diameter, in the longitudinal direction, extending from the value $dw1$ to the value $dw2$ and with the major diameter of the hub toothing extending from the value $Dn1$ to the value $Dn2$." See Col. 3, lines 29-62. In other words, because the longitudinal length for portions 9 and 10 are the same $L1$ and $L2$, respectively, for both the shaft toothing 5 and the hub toothing 7, as disclosed and shown clearly in Figure 1, Beigang teaches exact alignment of the various transition points and does not teach an offset.

Jacques is cited for teaching various other features of the present invention and Applicants respectfully submit that Jacques, alone or by any combination thereof, fails

to cure the deficiencies in Beigang with respect to Claim 1. Applicants respectfully submit that Jacques, alone or by any combination, does not teach or suggest a mechanism for transmitting torque between a shaft and a hub that includes, among other features, a shaft, a hub, and a retaining ring, wherein the hub is axially secured relative to the shaft by the retaining ring in a position disposed around the shaft while holding a shaft tooth section and a hub tooth section in engagement with each other, the shaft tooth section having shaft teeth formed on the shaft and the hub tooth section having hub teeth formed on the hub, wherein a first starting point of a first step region and a second starting point of a second step region are offset from each other in the axial direction of the shaft by a predetermined distance, and wherein the end of the second portion and the end of the second peak portion are offset from each other in the axial direction of the shaft by a predetermined distance.

Thus, Beigang and Jacques, alone or in any combination, do not teach or suggest the features of Claim 1. As such, the Applicants respectfully submit that one of ordinary skill in the art would not be motivated to modify Beigang and Jacques, individually or in any combination, since any modification would not arrive at the invention recited by Claim 1.

Applicants respectfully submit that the specific factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, (1966) have not been considered or properly applied in the Office Action. When rejecting claims under 35 U.S.C. §103, an Examiner bears an initial burden of presenting a *prima facie* case of obviousness. The Applicants respectfully submit that the Office Action has not made a proper *prima facie* rejection under 35 U.S.C. §103(a), because the prior art references fail to teach or

suggest the present invention as recited in Claim 1. Moreover, the prior art reference of Beigang does not teach or suggest, but specifically teaches away from, the Office Action's interpretations to justify the obviousness rejections.

For at least the reason(s) stated above, the Applicants respectfully submit that Beigang and Jacques do not render Claim 1 obvious. Accordingly, Claim 1 should be deemed allowable over Beigang and Jacques, and should also be deemed allowable over any combination of Beigang and Jacques.

Claims 4-6, 15 and 16 depend from Claim 1. It is respectfully submitted that these dependent claims be deemed allowable for at least the same reason Claim 1 is allowable, as well as for the additional subject matter recited therein.

Withdrawal of the rejection is respectfully requested.


Conclusion

In view of the foregoing, Applicants respectfully request reconsideration of the application, withdrawal of the outstanding rejections, allowance of Claims 1, 4-6, 15 and 16, and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 025416-00026.**

Respectfully submitted,



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Enclosure: Request for Continued Examination